

A NEW GENUS AND SPECIES OF POLYCHAETA COMMENSAL WITH A DEEP-SEA THYASIRID CLAM

James A. Blake

Abstract.—A new commensal species of polychaete has been discovered living between the gills of the deep-sea thyasirid clam, *Thyasira insignis*. The collections come from dense faunal communities recently discovered on the Laurentian Fan off Newfoundland and Nova Scotia. The species is named *Petrecca thyasira* new genus, new species, and is referred to the recently described family Nautilinidae, that was previously known for a single species associated with clams from the Japan Trench. Only one pair of antennae and a single tentacular segment are present. The subbiramous parapodia are well developed, but setae are reduced to one or two large hooked neuropodial spines. Nomenclatural problems that call into question the validity of the genus name *Nautilina* and the family name Nautilinidae are discussed.

During dives of the DSRV *Alvin* on the Laurentian Fan to explore the nature of the deposit of the 1929 Grand Banks earthquake and turbidity current, dense communities of living vesicomyid and thyasirid clams, gastropods, and other epifaunal taxa similar to those found in hydrothermal vent and cold seep environments were discovered (Mayer et al. 1988). The communities are at 3800–3900 m near the crests of gravel waves that were deposited by the turbidity current in 1929. Mayer et al. (1988) speculate that the communities were established subsequent to the 1929 earthquake and are sustained by chemosynthesis that is fueled by compounds derived from older organic-rich sediments that were exposed by the 1929 event.

During the course of exploring these communities, several specimens of the thyasirid clams were collected. Examination of the thyasirids revealed the presence of an unusual polychaete associated with the gills. The species has been determined to represent a new genus and species and is referred to the family Nautilinidae that was recently reported from calyptogenid clams collected from the Japan Trench. The types are de-

posited in the National Museum of Natural History, Smithsonian Institution (USNM).

Family Nautilinidae Miura & Laubier

Diagnosis.—Prostomium with 1–2 pairs of short antennae; a single poorly developed tentacular segment present bearing an aciculum and ventral cirrus, or tentacular segment entirely lacking; parapodia subbiramous, with notopodia and neuropodia well developed, notopodia with or without dorsal cirrus and notosetae; neuropodium with simple, hooked neuropodial spines. Proboscis soft, weakly muscular, partially eversible; without jaws or teeth.

Petrecca, new genus

Type species.—*Petrecca thyasira*, new species. Gender feminine.

Etymology.—This genus is named for Ms. Rosemarie Petrecca, marine biologist, who discovered this unique polychaete.

Diagnosis.—Body oval in cross section. Prostomium rounded, with 1 pair of antennae; eyes lacking. Pharynx weakly muscular, partially eversible. Peristomium reduced to small segment pressed near mouth,

bearing ventral cirrus. Parapodia subbiramous with ventral cirrus and no distinct dorsal cirrus; notopodium elongate, with single aciculum; neuropodium with single aciculum and 1–2 simple hooked spines. Pygidium simple, lacking cirri.

Remarks.—The combination of a single pair of antennae, reduced tentacular segment with an aciculum, lack of palps, subbiramous parapodia, and simple hooked neuropodial spines is entirely unique in the Polychaeta. In a search for possible free-living or parasitic families to which this animal could be referred, the Lacydoniidae, Hesionidae, and Pilargidae were initially considered. In the genus *Lacydonia*, the dorsal aspect of the anterior end bears a superficial resemblance to that of *Petrecca*. In *Lacydonia*, there are two pairs of antennae visible and a single reduced tentacular segment clearly visible posterior to the prostomium, while in *Petrecca*, there is only a single pair of antennae and the tentacular segment is not visible dorsally, but compressed ventrally near the oral opening. Further, *Lacydonia* has well developed parapodia with spreading fascicles of noto- and compound neurosetae, while in *Petrecca*, the parapodia are subbiramous and the setae are reduced to 1–2 simple neuropodial hooked spines. Among the Hesionidae, some genera are known which lack palps and have only a single pair of antennae. All of these genera, however, have four or more tentacular segments and all hesionids have compound neurosetae. The Pilargidae have genera that share some characters with *Petrecca*. Some genera have two antennae and all have simple setae. Several genera are known with large hooked spines reminiscent to those of *Petrecca*. However, pilargids have palps and the modified spines are notopodial instead of neuropodial. Further, no pilargids are known to be commensal or parasitic and to have the reduced setal complement present in *Petrecca*.

The recent paper by Miura & Laubier

(1989) describes *Nautilina calyptogenicola* from calyptogenid clams from the Japan Trench, an animal that is subtly similar to *Petrecca thyasira*. These authors referred their species to a new family, the Nautilinidae. A careful comparison of *P. thyasira* with *N. calyptogenicola* indicates that they are closely related. Both species have a similar subbiramous parapodial structure that includes a reduced notopodium bearing only an internal aciculum and a neuropodium with simple hooked spines. Both species have a small ventral cirrus. *Nautilina* has a dorsal cirrus, while in *Petrecca* the notopodium is elongated and the dorsal cirrus is lost although the digitiform tip seen on the notopodium may represent a remnant of a dorsal cirrus. Miura & Laubier (1989) indicate that *Nautilina* has two pairs of antennae and no tentacular segment at all, whereas *Petrecca* has a single pair of antennae and a very reduced segment located near the mouth that bears a ventral cirrus. For *Petrecca*, this cirrus is seen in dorsal view and superficially resembles a second pair of antennae. Both genera have a muscular pharyngeal structure. Miura & Laubier (1989) called it a proventriculus and suggested a close relationship to the Syllidae. The same structure in *Petrecca* is not considered a proventriculus because it appears to be soft and less well-developed than the syllid structure.

Both *N. calyptogenicola* and *P. thyasira* are found in deep-sea clams and clearly belong to different, yet closely related genera. The collection of two species in this new family in similar habitats on opposite sides of the globe within two years of one another is remarkable, yet indicative of the intense scientific interest to study the ecology of organisms found in vent, seep, and related communities. With the collection of additional species and more extensive morphological analysis we will hopefully be able to more fully interpret the relationships of the Nautilinidae with other polychaetes.

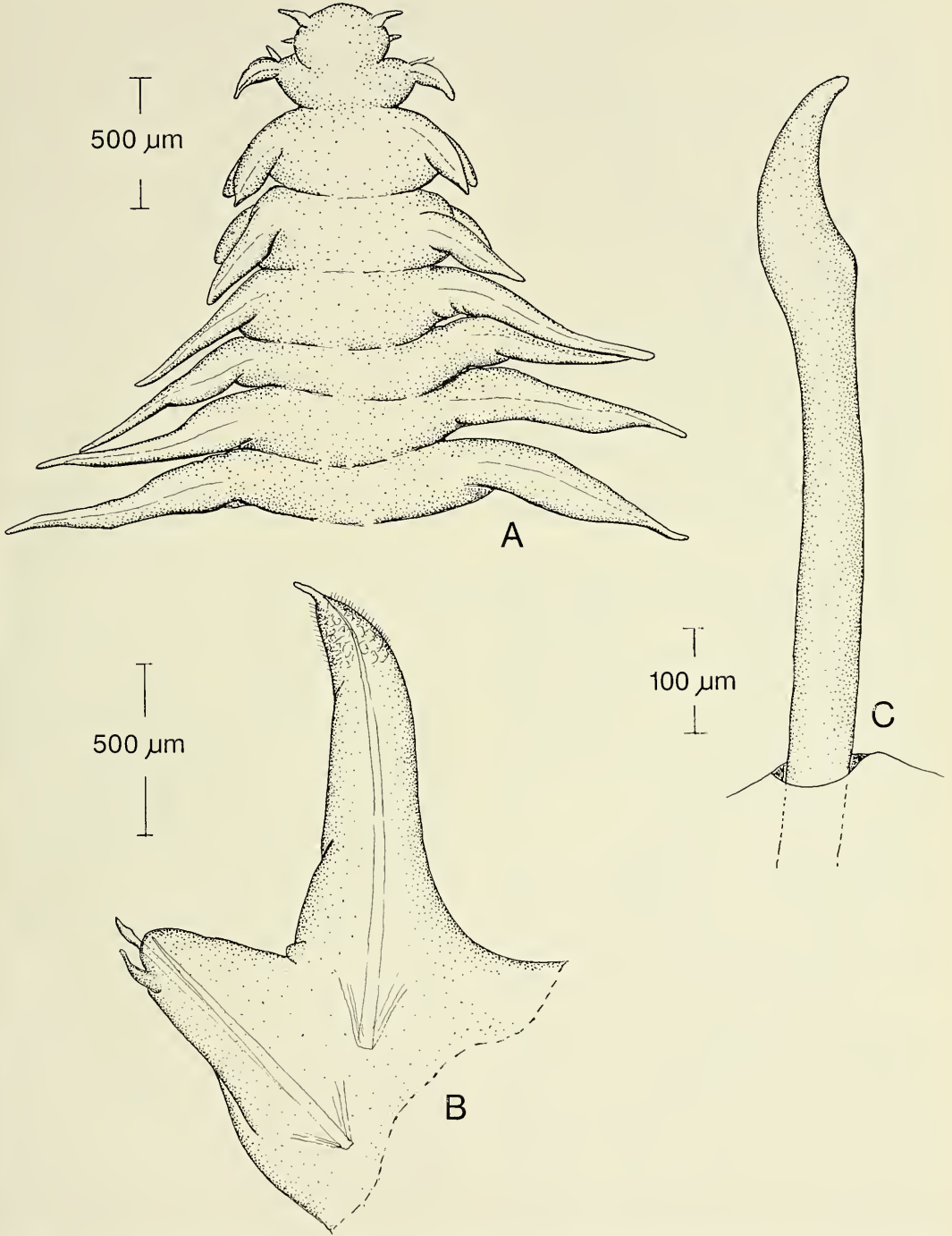


Fig. 1. *Petrecca thyasira* (USNM 126075). A, Anterior end and 7 segments in dorsal view; B, Middle parapodium; C, Neuroseta.

Petrecca thyasira, new species

Figs. 1, 2

Material examined.—Western North Atlantic, Laurentian Fan, R/V *Hudson*, Cruise 87-003, Sta. 13, 9 April 1987, 43°34.46'N, 55°38.35'W to 43°35.32'N, 55°38.23'W, 3718–3720 m, specimens found between layers of gill filaments of the thyasirid clam, *Thyasira insignis*, holotype (USNM 126074) and 4 paratypes (USNM 126075).

Description.—A moderate sized species. Holotype 16 mm long, 3 mm wide, including parapodia, with 51 setigerous segments. Four paratypes ranging from 4.4 to 12.5 mm long, 2 to 4 mm wide with 25 to 48 setigers. Color in alcohol light tan. Body narrower anteriorly, expanding in middle region due to elongated notopodia, and narrowing again posteriorly.

Prostomium rounded, as wide as long, with two digitiform antennae; without palps, eyes, or nuchal organs (Fig. 1A). Proboscis soft, eversible, with weak musculature. First or tentacular segment reduced, pressed tightly against sides of mouth opening (Fig. 2A); tentacular segment with reduced ventral lobe bearing aciculum and ventral cirrus, the latter sometimes visible dorsally (Figs. 1A, 2B).

Parapodia similar in structure, with elongated notopodium and more-or-less conical neuropodium, both supported by single internal aciculum. Notopodium of segment 2 subequal in length to neuropodium (Figs. 1A, 2B). Notopodium increasing in length over following segments becoming twice length of neuropodium (Figs. 1A, B, 2A). Notopodium tapering apically, with apex ciliated, glandular, terminating in digitiform tip. Neuropodium stubby, broadly rounded, bearing a short, digitiform ventral cirrus (Fig. 1B). Neuropodium with 1–2, large, hooked neuropodial spines (Fig. 1C).

Body terminating in narrow pygidium lacking cirri.

Etymology.—The species name refers to the generic name of the host animal, *Thyasira insignis*.

Remarks.—Of the ten specimens of *T.*

insignis, collected at Station 13, five were found to harbor a single specimen of *Petrecca thyasira*. One clam examined from Station 16 did not contain a polychaete. The clams are relatively small, ranging from 29 × 30 cm to 37 × 43 cm in width × length. Thus, the presence of worms up to 16 mm long in the clams is significant. Whether these polychaetes have a commensal or parasitic relationship with the clams has yet to be determined. According to Ms. Petrecca, the worms were found lying between layers of gill filaments. The long notopodia with glandular ciliated tips would appear to be a functional adaptation to living in the proximity of long gill filaments having similar shapes.

Among the many unusual polychaetes thus far described from hydrothermal vents and methane seep communities are polynoids that are commensal in the mantle cavities of large mytilid mussels (Pettibone 1984, 1986). The presence of a non-polynoid commensal in a deep-sea clam from faunal communities that resemble vent and seep faunas is thus of considerable interest. No specimens of *Petrecca thyasira*, however, have been collected outside of their molluscan hosts. Indeed the degree of reduction of the setae to a single ventral neuropodial hook would suggest that *P. thyasira* is highly adapted to a commensal habit. The same statements would hold for *Nautilina calyptogenicola*, that comes from calyptogenicid clams in the Japan Trench.

Other polychaetes reported from the mantle cavities of clams include: a hesionid, *Parasyllidea humesi*, that was described by Pettibone (1961) from an intertidal estuarine clam in West Africa; and an unusual pilargid-like polychaete, *Antonbrunnia viridis*, that was described by Hartman & Boss (1966) from 68–82 m off Madagascar.

Comments on the Validity of the Names *Nautilina* and Nautilinidae

I would like to point out a nomenclatural problem with the names *Nautilina* and Nautilinidae proposed by Miura and Lau-

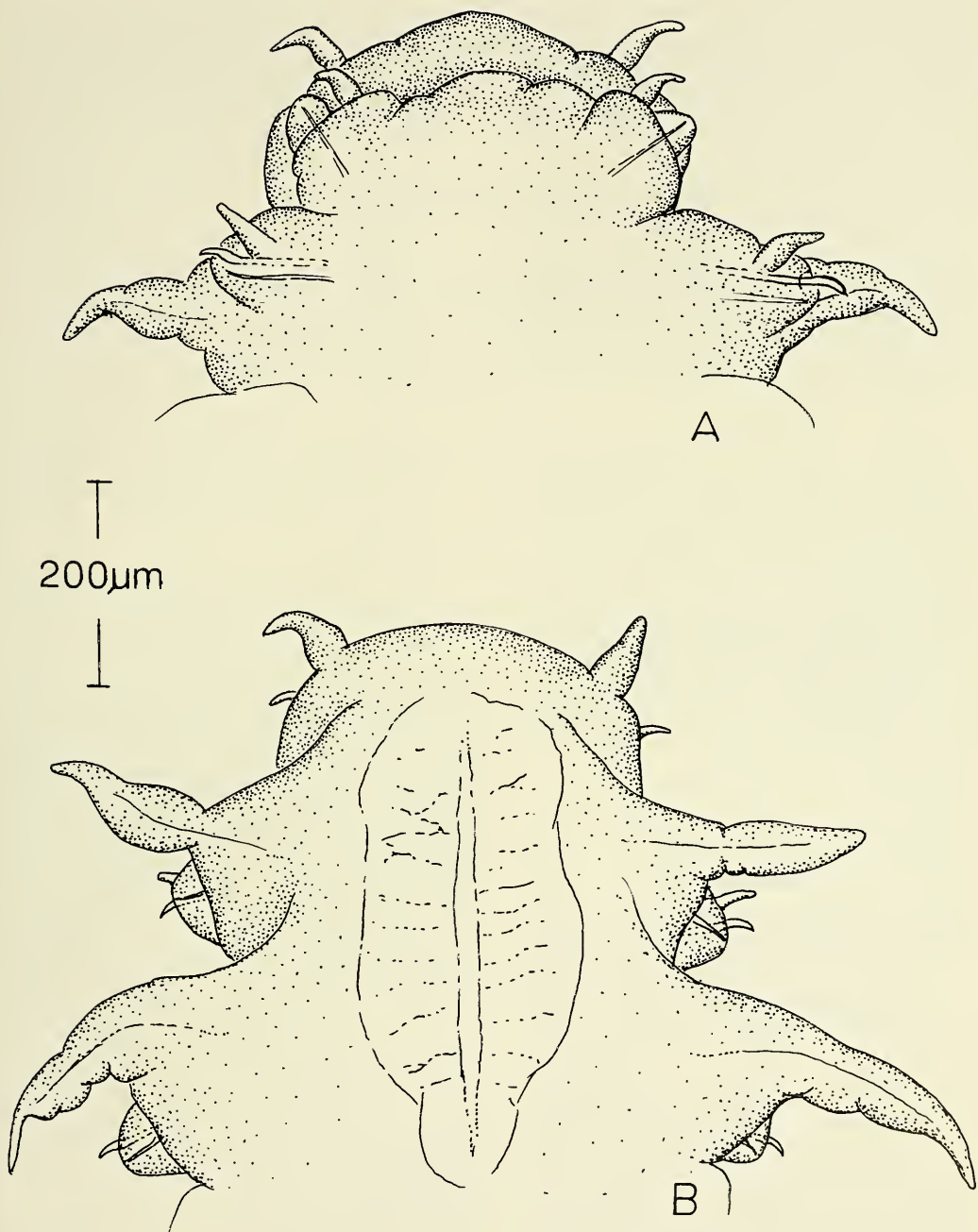


Fig. 2. *Petrecca thyasira*. A, Anterior end of paratype (USNM 126075) in ventral view; B, Anterior end of holotype (USNM 126074) in dorsal view.

bier (1989). The genus name, *Nautilina*, is preoccupied in the Mollusca, Cephalopoda, by the suborder name *Nautilina*, that was established by Shimanskii (1957). Although

this designation was dropped by Kummel et al. (1964) in their classification of the Nautiloidea, the molluscan suborder name and the polychaete generic name neverthe-

less represent senior and junior homonyms, respectively, and the latter must be re-named. It is my understanding that Dr. Miura will deal with that formality himself in a future paper. The family name Nautilinidae does not appear to have been used previously. However, because the rules of nomenclature clearly state that the generic name upon which the family-group taxon is based must be valid for a genus contained in that family, it is probable that the name Nautilinidae will also need to be replaced (ICZN 1985: Article 11 (f)).

Acknowledgments

This species was collected during a cruise on the R/V *Hudson* to the Laurentian Fan. Ms. Rosemarie Petrecca collected the thyasirid clams, removed the polychaetes, and initially recognized their unique morphology. Dr. Ruth Turner confirmed the identity of the clams. The manuscript benefitted from a careful review by Dr. Marian H. Pettibone. The collection of these materials was supported in part by NSF Grant OCE 83-11021 to Dr. J. Frederick Grassle.

Literature Cited

- Hartman, O., & K. J. Boss. 1966. *Antonbruunia viridis*, a new inquiline annelid with dwarf males, inhabiting a new species of pelecypod, *Lucina fosteri*, in the Mozambique Channel.—*Annals & Magazine of Natural History*, ser. 13, 8:177–186.
- International Code of Zoological Nomenclature. 1985. Third Edition. Adapted by the XX General Assembly of the International Union of Biological Sciences. University of California Press, Berkeley and Los Angeles, xx + 338 pp.
- Kummel, B., W. M. Furnish, & B. F. Glenister. 1964. Nautiloidea-Nautilida, pp. K383–K457. In R. C. Moore, ed., *Treatise on invertebrate paleontology*, Part K. Mollusca 3. Cephalopoda, general features, Endoceratoidea, Actinoceratoidea, Nautiloidea, Bactritoidea. U.S. Geological Society of America and the University of Kansas Press.
- Mayer, L. A., A. N. Shor, J. H. Clarke, & D. J. W. Piper. 1988. Dense biological communities at 3850 m on the Laurentian Fan and their relationship to the deposits of the 1929 Grand Banks earthquake.—*Deep-Sea Research* 35:1235–1246.
- Miura, T., & L. Laubier. 1989. *Nautilina calyptogenicola*, a new genus and species of parasitic polychaete on a vesicomid bivalve from the Japan Trench, representative of a new family Nautilinidae.—*Zoological Science* 6:387–390.
- Pettibone, M. H. 1961. New species of polychaete worms from the Atlantic Ocean, with a revision of the Dorvilleidae.—*Proceedings of the Biological Society of Washington*, 74:167–186.
- . 1984. A new scale-worm commensal with deep-sea mussels on the Galapagos hydrothermal vent (Polychaeta: Polynoidae).—*Proceedings of the Biological Society of Washington* 97:226–239.
- . 1986. A new scale-worm commensal with deep-sea mussels in the seep-sites at the Florida Escarpment in the Eastern Gulf of Mexico (Polychaeta: Polynoidae: Branchipolynoidae).—*Proceedings of the Biological Society of Washington* 99:444–451.
- Shimanskii, V. N. 1957. Systematics and phylogeny of the Order Nautilida.—*Byulleten' Moskovskogo Obshchestva Ispytatelei Prirody, otdel geologicheskii* 32(4):105–120. [In Russian.]
- Note Added in Proof: A new publication by Miura & Laubier (1990) designates the genus *Nautiliniella* and the family Nautiliniellidae to replace the homonyms *Nautilina* and Nautilinidae. In addition, these authors describe two new nautiliniellid genera and two species from the mantle cavities of bivalves from the deep-sea Hatsushima cold-seep site off Sagami Bay, Japan. The new taxa include *Shinkai sagamiensis* from *Calyptogena soyoae* and *Natsushima bifurcata* from *Solemya* sp. *Petrecca* differs from these new genera by having greatly elongated noto- and neuropodia, an achaetous peristomial segment, and in details of the setae. An as yet undescribed species from mussels at the cold-seep site on the Florida Escarpment is referable to *Natsushima*.
- Miura, T. & L. Laubier. 1990. Nautiliniellid polychaetes collected from the Hatsushima cold-seep site in Sagami Bay, with descriptions of new genera and species.—*Zoological Science* 7(2):319–325.
- Science Applications International Corporation, 89 Water Street, Woods Hole, Massachusetts 02543.